

Docket No.: N.C. 79,834

PATENT APPLICATION

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### Claims

What is claimed is:

1. An apparatus for creating a deposit of a material of interest on a substrate, the apparatus comprising

a first laser, wherein the first laser is a pulsed laser,

a second laser,

a receiving substrate, and

a target substrate comprising a laser-transparent support having a back surface and a front surface, wherein the front surface has a coating that comprises a source material, wherein the source material is a material that can be transformed into the material of interest,

means for positioning the first laser in relation to the target substrate so that pulsed laser energy can be directed through the back surface of the target substrate and through the laser-transparent support to strike the coating at a defined target location with sufficient energy to cause the source material to be removed from the surface of the support at the defined target location,

means for positioning the receiving substrate in a spaced relation to the target substrate so that the source material can migrate from the space between the receiving substrate and the target substrate and can be deposited at a defined receiving location on the receiving substrate,

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and

means for positioning the second laser so that laser energy can strike the source material that is deposited on the receiving substrate with sufficient energy to transform the source material into the material of interest.

2. The apparatus of Claim 1 wherein the first laser and the second laser are copropagating and coaxial.

3. The apparatus of Claim 2 further including shuttering means wherein the first laser or the second laser can be selected.

4. The apparatus of Claim 1 wherein the source material is a homogeneous mixture of an organometallic compound and a metal powder.

5. The apparatus of Claim 1 wherein the source material is a organometallic/metal powder combination selected from the group consisting of

silver I 2,4-pentanedionate/silver;

silver neodecanoate/silver;

platinum 2,4-pentanedionate/platinum;

indium 2,4-pentanedionate/indium;

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copper II 2,4-pentanedionate/copper; and

indium acetylacetoneate/indium.

6. The apparatus of Claim 1 wherein the source material is a homogeneous mixture of a hydrated metal alkoxide and a metal powder.

7. The apparatus of Claim 1 wherein the source material is a homogeneous mixture of an organometallic compound and an inorganic oxide powder.

8. The apparatus of Claim 1 wherein the source material is a mixture of a hydrated inorganic alkoxide and an inorganic oxide powder.

9. The apparatus of Claim 1 wherein the source material is a mixture of aluminum isopropoxide and aluminum oxide powder.

10. The apparatus of Claim 1 wherein the source material is an inorganic alkoxide/inorganic oxide mixture selected from the group consisting of barium titanium ethylhexano-isopropoxide/barium titanate powder and strontium titanium isopropoxide/strontium titanate powder.

11. The apparatus of Claim 1 wherein the source material is a mixture of one or more metal

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organic compounds.

12. The apparatus of Claim 1 wherein the source material is a mixture of one or more hydrated metal alkoxides.

13. The apparatus of Claim 1 wherein the first laser is a pulsed UV laser and the second laser is an IR laser.

14. The apparatus of Claim 1 further including means to maintain the receiving substrate at a constant temperature between -50 and 300 °C.

15. A method for creating a deposit of a material of interest on a receiving substrate, the method comprising the steps of

providing a first laser and a second laser, wherein the first laser is a pulsed laser,

providing a receiving substrate,

providing a target substrate comprising a laser-transparent support having a back surface and a front surface, wherein the front surface has a coating that comprises a source material, wherein the source material is a material that can be transformed into the material of interest,

positioning the first laser in relation to the target substrate and exposing the target substrate to pulsed laser energy so that the pulsed laser energy is directed through the back

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surface of the target substrate and through the laser-transparent support to strike the coating at a defined target location with sufficient energy to cause the source material to be removed from the surface of the support at the defined location,

positioning the receiving substrate in a spaced relation to the target substrate so that the source material is deposited at defined receiving location on the receiving substrate, and

positioning the second laser in relation to the receiving substrate so that laser energy strikes the deposited source material to transform the source material into the material of interest.

16. The method of Claim 15 including the further step of pretreating the receiving substrate by positioning the first laser or the second laser so that it strikes the receiving substrate before the source material is deposited thereon.

17. The method of Claim 15 wherein the receiving substrate is maintained at a constant temperature of between -50 °C and 300 °C.

18. The method of Claim 15 wherein the source material is a homogeneous mixture of an organometallic compound and a metal powder.

19. The method of Claim 15 wherein the source material is a organometallic/metal powder

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combination selected from the group consisting of

silver I 2,4-pentanedionate/silver;  
silver neodecanoate/silver;  
platinum 2,4-pentanedionate/platinum;  
indium 2,4-pentanedionate/indium;  
copper II 2,4-pentanedionate/copper; and  
indium acetylacetoneate/indium.

20. The method of Claim 15 wherein the source material is a homogeneous mixture of a hydrated metal alkoxide and a metal powder.
21. The method of Claim 15 wherein the source material is a hydrated metal alkoxide.
22. The method of Claim 15 wherein the source material is a mixture of aluminum isopropoxide and aluminum oxide powder.
23. The method of Claim 15 wherein the source material is an inorganic alkoxide/inorganic oxide mixture selected from the group consisting of barium titanium ethylhexano-isopropoxide/barium titanate powder and strontium titanium isopropoxide/strontium titanate powder.

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24. The method of Claim 15 wherein the source material is a mixture of one or more metal organic compounds.

25. The method of Claim 15 wherein the source material is a mixture of one or more hydrated metal alkoxides.

26. A method for creating a deposit of a material of interest on a receiving substrate, the method comprising the steps of

providing a target substrate comprising a laser-transparent support having a back surface and a front surface, wherein the front surface has a coating that comprises a source material, wherein the source material is a material that can be transformed into the material of interest,

providing a receiving substrate,

directing a pulsed laser beam through the back surface of the target substrate and through the laser-transparent support so that it strikes the coating at a defined target location with sufficient energy to cause the source material to be removed from the surface of the support at the defined location, and so that the source material is deposited at defined receiving location on the receiving substrate, and

directing a laser beam to strike the deposited source material to transform the source material into the material of interest.